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Chapter 2: Crystal Structures and Symmetry

Chapter 2 Slide 13 of 85 Crystal Lattices • To describe crystals, three-dimensional views must be used. • The repeating unit of the lattice is called the unit cell. • The simple cubic cell (primitive cubic) is the simplest unit cell and has structural particles centered only at its corners.

Sapphire: cryst. Al2O3 Insulin Chapter 3: The Structure of ...

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Chapter 2: Crystal Structures and Symmetry

2 Crystal Structures 2 Learning Objectives Distinguish between crystal structure and crystal system Relationship between atomic radius (R) and lattice parameter (a) Calculate Atomic Packing Factor (APF) and Volume density (ρ) Determine Indices for 'Directions' and 'Planes' in a crystal structure. 2-2 Chapter Outline

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CHAPTER 2 X-RAY CRYSTAL STRUCTURE DETERMINATON 2.1 INTRODUCTION The X-ray diffraction technique is based on an interference pattern produced by X-rays passing through a three-dimensional, repeating pattern of atoms within a crystal. It is the most powerful technique adopted to reveal the

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• Rare due to poor packing (only Po [84] has this structure) • Close-packed directions are cube edges. Coordination number = 6 Simple Cubic (SC) Structure •Coordination number is the number of nearest neighbors •Linear density (LD) is the number of atoms per unit length along a specific crystallographic direction a1 a2 a3 . . . LD

CHAPTER 3: CRYSTAL STRUCTURES & PROPERTIES

Crystal: Space Group By definition crystal is a periodic arrangement of repeating "motifs"(e.g. atoms, ions). The symmetry of a periodic pattern of repeated motifs is the total set of symmetry operations allowed by that pattern • Let us apply a rotation of 90 degrees about the center (point) of the pattern which is thought

to be indefinitely

CHAPTER 3: CRYSTAL STRUCTURES

2.2.3 Common semiconductor crystal structures The most common crystal structure among frequently used semiconductors is the diamond lattice, shown in Figure 2.2.5. Each atom in the diamond lattice has a covalent bond with four adjacent atoms, which together form a tetrahedron.

Chapter 2: Semiconductor Fundamentals

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Chapter 3: Crystal Structure

2.1.2 Garnet structure The garnets have orthorhombic crystal structure (oxygen polyhedra, surrounding the cations) but with trivalent cations (including rare earth and Fe 3+)

Chapter - 2

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CHAPTER 3: CRYSTAL STRUCTURES & PROPERTIES

Chapter 3 Chapter 3: The Structure of Crystalline Solids Crystal: a solid composed of atoms, ions, or moleculesarranged in a pattern that is repeated in three dimensions A material in which atoms are situated in a repeating or periodic array over large atomic distances Sapphire: cryst. Al 2 O 3 Insulin Chapter 3 3.1 Classification ...

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